

**GEOMAGNETIC FIELD LINE DATA FOR THE
NOVEMBER 12, 1966 TOTAL SOLAR ECLIPSE**

by

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INTRODUCTION

The total Solar Eclipse of November 12, 1966 is of considerable interest for ionospheric studies. The path of the total phase sweeps through the geomagnetic equatorial region and through the equatorial anomaly in areas where ionospheric and geomagnetic observatories are located, or where temporary observations can easily be arranged.

Geomagnetically conjugate observations should be of special interest, in particular, for studies of phenomena involving plasma flow and wave propagation along field lines. The following tables with data on field line geometry were prepared to facilitate planning of such experiments during the eclipse.

For the numerical calculations, a modified and implemented version of McIlwain's INVAR code* was used, which, retaining the characteristics of controllable accuracy and speed of INVAR, gives all the additional information such as conjugate intersects, equatorial points, total arc lengths, etc., without requiring a second line tracing. The geomagnetic field expansion used is that given by Cain et al.¹, updated to November 1966. Computing time per field line on the IBM 7094 is of the order of 0.5 sec. for $L < 2$. The code used here is available on request.

EXPLANATION OF THE TABLES

Columns in Tables I-IV are self-explanatory. The "origin" of each field line is taken at the instantaneous position of the central point of the total phase at 300 Km altitude (Table I), and at sea level. In Tables III and IV, the origin is taken at the northern and southern limit, at sea level, respectively. Data on the eclipse are those published by J. S. Duncombe². West longitudes are negative, total field intensities are given in Gauss, altitudes and arc lengths in Kilometers. McIlwain's L parameter³ is given in earth radii. "Equator" is the point of the field line at which the total field intensity is minimum (this is not the dip equator, which may differ in latitude as much as 3-4 degrees). The "conjugate intersect" is the intersection of the field line with a level of constant altitude, equal to that of the origin (300 Km in Table I, sea level in Table II). The conjugate intersect is not computed when the origin is within about 1000 Km of the geomagnetic equator.

*Distributed by Dr. C. McIlwain, University of California, San Diego.

The map in Figure 1 shows the path of the total phase and the corresponding conjugate intersects, at an altitude of 300 Km. An inspection of this graph leads to the following remarks:

- a. The phase of maximum duration occurs just in the South American Anomaly of the inner radiation belt, i.e., in the region where the steady, low latitude, electron precipitation is maximum^{4,5}.
- b. The passage through the equatorial anomaly (supposed at the conjugate intersects of the field line reaching out to about 800 Km altitude at its equatorial point) occurs not far from Porto Alegre (Brazil), with a conjugate intersect close to Paramaribo (Surinam).
- c. During the late stage of the eclipse, the conjugate area approaches northern Europe.

REFERENCES

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Table I

Data on field lines passing through points of the central line of the total phase at 300 Km altitude (points called "origin"). Equator: point of minimum total field intensity on each field line. Conjugate: intersection of the field line with the 300 Km level on the other hemisphere. Field intensities are in Gauss, altitudes and arc lengths (between origin and conjugate intersect) are in Km.

TOTAL SOLAR ECLIPSE OF 12 NOVEMBER 1966

CENTRAL LINE OF TOTAL ECLIPSE 300 KM

U.T. H.M.	ORIGIN			EQUATOR			CONJUGATE								
	LAT	LONG	DIP	LAT	LONG	DIP	LAT	LONG	DIP						
12 38	-1.04	-97.22	0.288	17.51	1.080	-9.42	-98.92	0.246	463.6	0.222	0.246	16.73	-100.35	0.266	1.87
12 39	-0.28	-93.96	0.284	16.34	1.081	-10.24	-95.54	0.246	439.8	0.202	0.246	15.82	-96.82	0.262	16.64
12 40	-1.25	-91.75	0.280	15.43	1.081	-10.89	-93.26	0.246	422.3	0.192	0.246	15.40	-94.40	0.259	15.69
12 41	-2.07	-90.00	0.278	14.64	1.081	-11.27	-91.40	0.246	409.1	0.182	0.246	14.95	-92.45	0.257	14.86
12 42	-2.80	-88.51	0.275	13.89	1.082	-11.76	-89.85	0.245	396.4	0.172	0.245	14.30	-90.79	0.255	14.10
12 43	-3.40	-86.03	0.270	13.21	1.083	-12.49	-87.24	0.245	375.6	0.152	0.245	13.58	-88.93	0.252	13.35
12 44	-4.10	-84.01	0.266	12.51	1.084	-13.02	-85.05	0.244	358.7	0.142	0.244	12.85	-87.65	0.249	12.68
12 45	-4.52	-82.25	0.263	11.81	1.085	-13.59	-83.16	0.244	343.2	0.132	0.244	12.10	-86.32	0.247	12.07
12 46	-4.91	-80.69	0.259	9.71	1.086	-14.12	-81.49	0.243							
12 47	-5.29	-79.39	0.254	5.68	1.089	-15.10	-77.93	0.241							
12 48	-5.63	-78.33	0.244	2.73	1.093	-15.73	-74.98	0.239							
12 49	-5.93	-77.50	0.239	-0.19	1.097	-16.24	-72.45	0.236							
13 00	-6.19	-76.86	0.234	-3.09	1.102	-16.79	-70.25	0.233							
13 01	-6.43	-76.33	0.230	-5.85	1.107	-17.02	-68.29	0.230							
13 02	-6.65	-75.83	0.226	-8.59	1.113	-17.25	-66.32	0.226							
13 03	-6.85	-75.33	0.223	-11.26	1.121	-17.28	-64.91	0.222	349.1	0.152	0.246	16.73	-100.35	0.266	1.87
13 04	-7.03	-74.83	0.220	-13.84	1.129	-17.08	-63.43	0.217	388.4	0.182	0.246	15.82	-96.82	0.262	16.64
13 05	-7.21	-74.33	0.217	-16.79	1.138	-16.79	-62.08	0.212	428.5	0.222	0.246	15.40	-94.40	0.259	15.69
13 06	-7.38	-73.83	0.214	-19.80	1.149	-16.79	-60.80	0.206	473.9	0.262	0.246	14.95	-92.45	0.257	14.86
13 07	-7.54	-73.33	0.211	-22.81	1.161	-16.79	-59.62	0.200	523.1	0.302	0.246	14.30	-90.79	0.255	14.10
13 08	-7.69	-72.83	0.208	-25.85	1.174	-16.79	-58.48	0.194	568.8	0.342	0.246	13.58	-88.93	0.252	13.35
13 09	-7.83	-72.33	0.205	-28.94	1.188	-16.79	-57.38	0.187	615.1	0.382	0.246	12.85	-87.65	0.249	12.68
13 10	-7.96	-71.83	0.202	-32.08	1.203	-16.79	-56.35	0.180	662.6	0.422	0.246	12.10	-86.32	0.247	12.07
13 11	-8.09	-71.33	0.200	-35.27	1.219	-16.79	-55.38	0.173	710.5	0.462	0.246	11.35	-85.05	0.245	11.35
13 12	-8.21	-70.83	0.198	-38.51	1.236	-16.79	-54.46	0.166	758.8	0.502	0.246	10.60	-83.78	0.243	10.60
13 13	-8.33	-70.33	0.196	-41.80	1.254	-16.79	-53.58	0.159	807.3	0.542	0.246	9.85	-82.51	0.241	9.85
13 14	-8.45	-69.83	0.194	-45.14	1.273	-16.79	-52.75	0.152	856.0	0.582	0.246	9.10	-81.24	0.239	9.10
13 15	-8.57	-69.33	0.192	-48.53	1.293	-16.79	-51.96	0.145	904.9	0.622	0.246	8.35	-80.00	0.237	8.35
13 16	-8.69	-68.83	0.190	-51.97	1.314	-16.79	-51.21	0.138	954.0	0.662	0.246	7.60	-78.77	0.235	7.60
13 17	-8.81	-68.33	0.188	-55.46	1.336	-16.79	-50.50	0.131	1003.3	0.702	0.246	6.85	-77.54	0.233	6.85
13 18	-8.93	-67.83	0.186	-58.99	1.359	-16.79	-49.83	0.124	1052.8	0.742	0.246	6.10	-76.31	0.231	6.10
13 19	-9.05	-67.33	0.184	-62.57	1.383	-16.79	-49.20	0.117	1102.5	0.782	0.246	5.35	-75.08	0.229	5.35
13 20	-9.17	-66.83	0.182	-66.20	1.408	-16.79	-48.60	0.110	1152.4	0.822	0.246	4.60	-73.85	0.227	4.60
13 21	-9.29	-66.33	0.180	-69.87	1.434	-16.79	-48.02	0.103	1202.5	0.862	0.246	3.85	-72.62	0.225	3.85
13 22	-9.41	-65.83	0.178	-73.59	1.461	-16.79	-47.47	0.096	1252.8	0.902	0.246	3.10	-71.39	0.223	3.10
13 23	-9.53	-65.33	0.176	-77.36	1.489	-16.79	-46.94	0.089	1303.3	0.942	0.246	2.35	-70.16	0.221	2.35
13 24	-9.65	-64.83	0.174	-81.18	1.518	-16.79	-46.43	0.082	1354.0	0.982	0.246	1.60	-68.93	0.219	1.60
13 25	-9.77	-64.33	0.172	-85.05	1.548	-16.79	-45.93	0.075	1404.9	1.022	0.246	0.85	-67.70	0.217	0.85
13 26	-9.89	-63.83	0.170	-88.97	1.579	-16.79	-45.44	0.068	1456.0	1.062	0.246	0.10	-66.47	0.215	0.10
13 27	-10.01	-63.33	0.168	-92.94	1.611	-16.79	-44.96	0.061	1507.3	1.102	0.246	-0.65	-65.24	0.213	-0.65
13 28	-10.13	-62.83	0.166	-96.96	1.644	-16.79	-44.49	0.054	1558.8	1.142	0.246	-1.40	-64.01	0.211	-1.40
13 29	-10.25	-62.33	0.164	-101.03	1.678	-16.79	-44.03	0.047	1610.5	1.182	0.246	-2.15	-62.64	0.209	-2.15
13 30	-10.37	-61.83	0.162	-105.15	1.713	-16.79	-43.58	0.040	1662.4	1.222	0.246	-2.90	-61.27	0.207	-2.90
13 31	-10.49	-61.33	0.160	-109.32	1.749	-16.79	-43.13	0.033	1714.5	1.262	0.246	-3.65	-59.89	0.205	-3.65
13 32	-10.61	-60.83	0.158	-113.54	1.786	-16.79	-42.68	0.026	1766.8	1.302	0.246	-4.40	-58.52	0.203	-4.40
13 33	-10.73	-60.33	0.156	-117.81	1.824	-16.79	-42.24	0.019	1819.3	1.342	0.246	-5.15	-57.15	0.201	-5.15
13 34	-10.85	-59.83	0.154	-122.13	1.863	-16.79	-41.80	0.012	1872.0	1.382	0.246	-5.90	-55.78	0.199	-5.90
13 35	-10.97	-59.33	0.152	-126.50	1.903	-16.79	-41.36	0.005	1924.9	1.422	0.246	-6.65	-54.41	0.197	-6.65
13 36	-11.09	-58.83	0.150	-130.92	1.944	-16.79	-40.92	0.000	1978.0	1.462	0.246	-7.40	-53.04	0.195	-7.40
13 37	-11.21	-58.33	0.148	-135.39	1.986	-16.79	-40.48	-0.007	2031.3	1.502	0.246	-8.15	-51.67	0.193	-8.15
13 38	-11.33	-57.83	0.146	-139.91	2.029	-16.79	-40.04	-0.014	2084.8	1.542	0.246	-8.90	-50.30	0.191	-8.90
13 39	-11.45	-57.33	0.144	-144.48	2.073	-16.79	-39.60	-0.021	2138.5	1.582	0.246	-9.65	-48.93	0.189	-9.65
13 40	-11.57	-56.83	0.142	-149.10	2.118	-16.79	-39.16	-0.028	2192.4	1.622	0.246	-10.40	-47.56	0.187	-10.40
13 41	-11.69	-56.33	0.140	-153.77	2.164	-16.79	-38.72	-0.035	2246.5	1.662	0.246	-11.15	-46.19	0.185	-11.15
13 42	-11.81	-55.83	0.138	-158.49	2.211	-16.79	-38.28	-0.042	2300.8	1.702	0.246	-11.90	-44.82	0.183	-11.90
13 43	-11.93	-55.33	0.136	-163.26	2.259	-16.79	-37.84	-0.049	2355.3	1.742	0.246	-12.65	-43.45	0.181	-12.65
13 44	-12.05	-54.83	0.134	-168.08	2.308	-16.79	-37.40	-0.056	2409.9	1.782	0.246	-13.40	-42.08	0.179	-13.40
13 45	-12.17	-54.33	0.132	-172.95	2.358	-16.79	-36.96	-0.063	2464.6	1.822	0.246	-14.15	-40.71	0.177	-14.15
13 46	-12.29	-53.83	0.130	-177.87	2.409	-16.79	-36.52	-0.070	2519.4	1.862	0.246	-14.90	-39.34	0.175	-14.90
13 47	-12.41	-53.33	0.128	-182.84	2.461	-16.79	-36.08	-0.077	2574.3	1.902	0.246	-15.65	-37.97	0.173	-15.65
13 48	-12.53	-52.83	0.126	-187.86	2.514	-16.79	-35.64	-0.084	2629.4	1.942	0.246	-16.40	-36.60	0.171	-16.40
13 49	-12.65	-52.33	0.124	-192.93	2.568	-16.79	-35.20	-0.091	2684.6	1.982	0.246	-17.15	-35.23	0.169	-17.15
13 50	-12.77	-51.83	0.122	-198.05	2.623	-16.79	-34.76	-0.098	2739.9	2.022	0.246	-17.90	-33.86	0.167	-17.90
13 51	-12.89	-51.33	0.120	-203.22	2.679	-16.79	-34.32	-0.105	2795.3	2.062	0.246	-18.65	-32.49	0.165	-18.65
13 52	-13.01	-50.83	0.118	-208.44	2.736	-16.79	-33.88	-0.112	2850.8	2.102	0.246	-19.40	-31.12	0.163	-19.40
13 53	-13.13	-50.33	0.116	-213.71	2.794	-16.79	-33.44	-0.119	2906.4	2.142	0.246	-20.15	-29.75	0.161	-20.15
13 54	-13.25	-49.83	0.114	-219.03	2.853	-16.79	-33.00	-0.126	2962.1	2.182	0.246	-20.90	-28.38	0.159	-20.90
13 55	-13.37	-49.33	0.112	-224.40	2.913	-16.79	-32.56	-0.133	3017.9	2.222	0.246	-21.65	-27.01	0.157	-21.65
13 56	-13.49	-48.83	0.110	-229.82	2.974	-16.79	-32.12	-0.140	3073.8	2.262	0.246	-22.40	-25.64	0.155	-22.40
13 57	-13.61	-48.33	0.108	-235.29	3.036	-16.7									

Table II
Data on field lines passing through points of the central line of the total phase at sea level.

TOTAL SOLAR ECLIPSE OF 12 NOVEMBER 1966
CENTRAL LINE OF TOTAL ECLIPSE

U.T. H.M.	ORIGIN			EQUATOR			CONJUGATE		
	LAT	LONG	DIP	LAT	LONG	DIP	LAT	LONG	DIP
12 00	-104.00	0.333	15.93	1.021	-7.51	-105.56	0.292	128.0	0.19E 04
12 03	-100.15	0.329	14.70	1.021	-8.27	-101.64	0.292	106.6	0.17E 04
12 06	-96.11	0.324	13.26	1.022	-9.27	-97.51	0.291	83.8	0.15E 04
12 09	-92.17	0.317	11.46	1.023	-10.06	-95.02	0.291	68.8	0.14E 04
12 12	-88.19	0.314	10.71	1.024	-11.71	-92.08	0.290	51.0	0.13E 04
12 15	-84.16	0.311	10.05	1.025	-13.14	-89.42	0.289	48.3	0.12E 04
12 18	-80.13	0.306	8.69	1.027	-14.15	-87.49	0.287	40.8	0.11E 04
12 21	-76.10	0.301	7.44	1.029	-15.40	-85.41	0.286		NO COMPUTATION
12 24	-72.07	0.297	6.24	1.031	-16.45	-83.56	0.284		NO COMPUTATION
12 27	-68.04	0.293	5.06	1.033	-17.30	-81.91	0.282		NO COMPUTATION
12 30	-64.01	0.288	3.90	1.035	-17.99	-80.42	0.281		NO COMPUTATION
12 33	-60.00	0.286	2.75	1.038	-18.43	-79.04	0.279		NO COMPUTATION
12 36	-56.00	0.278	-0.09	1.043	-19.73	-75.96	0.274		NO COMPUTATION
12 39	-52.00	0.271	-2.89	1.049	-21.06	-73.33	0.270		NO COMPUTATION
12 42	-48.00	0.265	-5.65	1.056	-22.36	-71.01	0.265		NO COMPUTATION
12 45	-44.00	0.260	-8.35	1.063	-23.56	-68.93	0.260		NO COMPUTATION
12 48	-40.00	0.255	-11.00	1.071	-24.66	-67.05	0.254	38.8	0.14E 04
12 51	-36.00	0.252	-13.59	1.079	-25.66	-65.33	0.248	75.6	0.17E 04
12 54	-32.00	0.249	-16.10	1.089	-26.56	-63.76	0.242	121.7	0.21E 04
12 57	-28.00	0.247	-18.54	1.100	-27.36	-62.31	0.235	177.7	0.25E 04
13 00	-24.00	0.245	-20.91	1.111	-28.06	-60.95	0.228	243.3	0.29E 04
13 03	-20.00	0.243	-23.19	1.125	-28.66	-59.67	0.220	319.2	0.33E 04
13 06	-16.00	0.241	-25.40	1.139	-29.16	-58.45	0.212	404.7	0.37E 04
13 09	-12.00	0.239	-27.54	1.156	-29.54	-57.30	0.204	503.1	0.41E 04
13 12	-8.00	0.237	-29.60	1.173	-30.81	-56.16	0.195	609.8	0.46E 04
13 15	-4.00	0.235	-31.59	1.193	-31.91	-55.06	0.186	731.8	0.51E 04
13 18	0.00	0.233	-33.52	1.214	-32.89	-53.97	0.176	865.2	0.56E 04
13 21	4.00	0.231	-35.40	1.238	-33.76	-52.85	0.167	1010.5	0.61E 04
13 24	8.00	0.229	-37.22	1.264	-34.58	-51.73	0.157	1161.5	0.67E 04
13 27	12.00	0.227	-38.99	1.292	-35.35	-50.56	0.147	1318.6	0.73E 04
13 30	16.00	0.225	-40.72	1.322	-36.06	-49.35	0.137	1481.4	0.79E 04
13 33	20.00	0.223	-42.41	1.355	-36.73	-48.08	0.127	1649.7	0.86E 04
13 36	24.00	0.221	-44.07	1.392	-37.36	-46.73	0.118	1823.6	0.93E 04
13 39	28.00	0.219	-45.70	1.431	-37.86	-45.42	0.108	2003.0	1.00E 05
13 42	32.00	0.217	-47.31	1.474	-38.33	-44.14	0.099	2187.8	1.11E 05
13 45	36.00	0.215	-48.89	1.521	-38.76	-42.89	0.090	2376.5	1.22E 05
13 48	40.00	0.213	-50.46	1.573	-39.16	-41.67	0.082	2568.9	1.33E 05
13 51	44.00	0.211	-52.01	1.629	-39.53	-40.47	0.073	2764.5	1.44E 05
13 54	48.00	0.209	-53.54	1.689	-39.86	-39.28	0.066	2963.0	1.55E 05
13 57	52.00	0.207	-55.05	1.755	-40.16	-38.06	0.059	3164.2	1.66E 05
14 00	56.00	0.205	-56.54	1.826	-40.43	-36.81	0.052	3368.0	1.77E 05
14 03	60.00	0.203	-58.00	1.901	-40.66	-35.54	0.046	3574.2	1.88E 05
14 06	64.00	0.201	-59.42	1.982	-40.86	-34.28	0.041	3782.5	1.99E 05
14 09	68.00	0.199	-60.78	2.065	-41.03	-33.03	0.036	3992.8	2.10E 05
14 12	72.00	0.197	-62.07	2.148	-41.18	-31.78	0.032	4204.8	2.22E 05
14 15	76.00	0.195	-63.24	2.225	-41.30	-30.54	0.028	4418.2	2.33E 05
14 18	80.00	0.193	-64.40	2.293	-41.39	-29.31	0.024	4632.8	2.44E 05
14 21	84.00	0.191	-65.54	2.352	-41.45	-28.06	0.020	4848.5	2.55E 05
14 24	88.00	0.189	-66.68	2.401	-41.49	-26.81	0.016	5065.2	2.66E 05
14 27	92.00	0.187	-67.82	2.441	-41.51	-25.56	0.012	5282.8	2.77E 05
14 30	96.00	0.185	-68.95	2.472	-41.52	-24.31	0.008	5501.2	2.88E 05
14 33	100.00	0.183	-70.08	2.504	-41.53	-23.06	0.004	5720.2	2.99E 05
14 36	104.00	0.181	-71.21	2.537	-41.54	-21.81	0.000	5940.0	3.10E 05
14 39	108.00	0.179	-72.34	2.571	-41.55	-20.56	0.000	6160.0	3.21E 05
14 42	112.00	0.177	-73.47	2.606	-41.56	-19.31	0.000	6380.0	3.32E 05
14 45	116.00	0.175	-74.60	2.642	-41.57	-18.06	0.000	6600.0	3.43E 05
14 48	120.00	0.173	-75.73	2.679	-41.58	-16.81	0.000	6820.0	3.54E 05
14 51	124.00	0.171	-76.86	2.717	-41.59	-15.56	0.000	7040.0	3.65E 05
14 54	128.00	0.169	-78.00	2.756	-41.60	-14.31	0.000	7260.0	3.76E 05
14 57	132.00	0.167	-79.13	2.796	-41.61	-13.06	0.000	7480.0	3.87E 05
15 00	136.00	0.165	-80.26	2.837	-41.62	-11.81	0.000	7700.0	3.98E 05
15 03	140.00	0.163	-81.39	2.879	-41.63	-10.56	0.000	7920.0	4.09E 05
15 06	144.00	0.161	-82.52	2.922	-41.64	-9.31	0.000	8140.0	4.20E 05
15 09	148.00	0.159	-83.65	2.966	-41.65	-8.06	0.000	8360.0	4.31E 05
15 12	152.00	0.157	-84.78	3.011	-41.66	-6.81	0.000	8580.0	4.42E 05
15 15	156.00	0.155	-85.91	3.057	-41.67	-5.56	0.000	8800.0	4.53E 05
15 18	160.00	0.153	-87.04	3.104	-41.68	-4.31	0.000	9020.0	4.64E 05
15 21	164.00	0.151	-88.17	3.152	-41.69	-3.06	0.000	9240.0	4.75E 05
15 24	168.00	0.149	-89.30	3.201	-41.70	-1.81	0.000	9460.0	4.86E 05
15 27	172.00	0.147	-90.43	3.251	-41.71	-0.56	0.000	9680.0	4.97E 05
15 30	176.00	0.145	-91.56	3.302	-41.72	0.69	0.000	9900.0	5.08E 05
15 33	180.00	0.143	-92.69	3.354	-41.73	1.94	0.000	10120.0	5.19E 05
15 36	184.00	0.141	-93.82	3.407	-41.74	3.19	0.000	10340.0	5.30E 05
15 39	188.00	0.139	-94.95	3.461	-41.75	4.44	0.000	10560.0	5.41E 05
15 42	192.00	0.137	-96.08	3.516	-41.76	5.69	0.000	10780.0	5.52E 05
15 45	196.00	0.135	-97.21	3.572	-41.77	6.94	0.000	11000.0	5.63E 05
15 48	200.00	0.133	-98.34	3.629	-41.78	8.19	0.000	11220.0	5.74E 05
15 51	204.00	0.131	-99.47	3.687	-41.79	9.44	0.000	11440.0	5.85E 05
15 54	208.00	0.129	-100.60	3.746	-41.80	10.69	0.000	11660.0	5.96E 05
15 57	212.00	0.127	-101.73	3.806	-41.81	11.94	0.000	11880.0	6.07E 05
16 00	216.00	0.125	-102.86	3.867	-41.82	13.19	0.000	12100.0	6.18E 05
16 03	220.00	0.123	-103.99	3.929	-41.83	14.44	0.000	12320.0	6.29E 05
16 06	224.00	0.121	-105.12	3.992	-41.84	15.69	0.000	12540.0	6.40E 05
16 09	228.00	0.119	-106.25	4.056	-41.85	16.94	0.000	12760.0	6.51E 05
16 12	232.00	0.117	-107.38	4.121	-41.86	18.19	0.000	12980.0	6.62E 05
16 15	236.00	0.115	-108.51	4.187	-41.87	19.44	0.000	13200.0	6.73E 05
16 18	240.00	0.113	-109.64	4.254	-41.88	20.69	0.000	13420.0	6.84E 05
16 21	244.00	0.111	-110.77	4.322	-41.89	21.94	0.000	13640.0	6.95E 05
16 24	248.00	0.109	-111.90	4.391	-41.90	23.19	0.000	13860.0	7.06E 05
16 27	252.00	0.107	-113.03	4.461	-41.91	24.44	0.000	14080.0	7.17E 05
16 30	256.00	0.105	-114.16	4.532	-41.92	25.69	0.000	14300.0	7.28E 05
16 33	260.00	0.103	-115.29	4.604	-41.93	26.94	0.000	14520.0	7.39E 05
16 36	264.00	0.101	-116.42	4.677	-41.94	28.19	0.000	14740.0	7.50E 05
16 39	268.00	0.099	-117.55	4.751	-41.95	29.44	0.000	14960.0	7.61E 05
16 42	272.00	0.097	-118.68	4.826	-41.96	30.69	0.000	15180.0	7.72E 05
16 45	276.00	0.095	-119.81	4.902	-41.97	31.94	0.000	15400.0	7.83E 05
16 48	280.00	0.093	-120.94	4.979	-41.98	33.19	0.000	15620.0	7.94E 05
16 51	284.00	0.091	-122.07	5.057	-41.99	34.44	0.000	15840.0	8.05E 05
16 54	288.00	0.089	-123.20	5.136	-42.00	35.69	0.000	16060.0	8.16E 05
16 57	292.00	0.087	-124.33	5.216	-42.01	36.94	0.000	16280.0	8.27E 05
17 00	296.00	0.085	-125.46	5.297	-42.02	38.19	0.000	16500.0	8.38E 05
17 03	300.00	0.083	-126.59	5.379	-42.03	39.44	0.000	16720.0	8.49E 05
17 06	304.00	0.081	-127.72	5.462	-42.04	40.69	0.000	16940.0	8.60E 05
17 09	308.00	0.079	-128.85	5.546	-42.05	41.94	0.000	17160.0	8.71E 05
17 12	312.00	0.077	-129.98	5.631	-42.06	43.19	0.000	17380.0	8.82E 05
17 15	316.00	0.075	-131.11	5.717	-42.07	44.44	0.000	17600.0	8.93E 05
17 18	320.00	0.073	-132.24	5.804	-42.08	45.69	0.000	17820.0	9.04E 05
17 21	324.00	0.071	-133.37	5.892	-42.09	46.94	0.000	18040.0	9.15E 05
17 24	328.00	0.069	-134.50	5.981	-42.10	48.19	0.000	18260.0	9.26E 05
17 27	332.00	0.067	-135.63	6.071	-42.11	49.44	0.000	18480.0	9.37E 05
17 30	336.00	0.065	-136.76	6.162	-42.12	50.69			

Table III

Data on field lines passing through points of the northern limit of the total phase at sea level.

TOTAL SOLAR ECLIPSE OF 12 NOVEMBER 1966

NORTHERN LIMIT OF TOTAL PHASE

U.T.	ORIGIN				EQUATOR				CONJUGATE					
H.M.	LAT	LONG	B	DIP	L	LAT	LCMG	B	ALT	ARC	LAT	LONG	B	DIP
12 43	2.12	-103.93	0.333	16.17	1.022	-7.70	-102.54	0.291	131.3	0.19E 04	-14.26	-106.77	0.311	-16.53
12 44	0.53	-99.28	0.329	14.76	1.022	-8.55	-100.79	0.291	106.8	0.17E 04	-14.32	-101.90	0.306	-15.08
12 44	-0.91	-95.57	0.324	13.46	1.023	-9.54	-97.02	0.291	85.5	0.16E 04	-14.41	-97.96	0.301	-13.74
12 45	-1.93	-93.20	0.320	12.53	1.023	-10.16	-94.87	0.290	72.2	0.14E 04	-14.49	-95.40	0.298	-12.78
12 46	-2.79	-91.35	0.317	11.74	1.024	-10.73	-92.85	0.289	61.2	0.13E 04	-14.54	-93.38	0.296	-11.98
12 47	-3.55	-89.78	0.314	11.01	1.025	-11.17	-91.02	0.288	52.3	0.13E 04	-14.58	-91.66	0.293	-11.20
12 48	-4.24	-88.42	0.311	10.33	1.026	-11.61	-89.50	0.288	44.2	0.12E 04	-14.60	-90.15	0.292	-10.51
12 50	-5.49	-86.09	0.306	9.04	1.028	-12.33	-87.14	0.286		NO COMPUTATION				
12 52	-6.63	-84.13	0.302	7.82	1.030	-13.00	-85.06	0.285		NO COMPUTATION				
12 54	-7.67	-82.40	0.297	6.62	1.032	-13.62	-83.24	0.283		NO COMPUTATION				
12 56	-8.65	-80.86	0.293	5.46	1.034	-14.06	-81.58	0.281		NO COMPUTATION				
12 58	-9.58	-79.46	0.290	4.30	1.036	-14.56	-80.08	0.280		NO COMPUTATION				
13 00	-10.47	-78.17	0.286	3.16	1.038	-14.95	-78.69	0.278		NO COMPUTATION				
13 05	-12.55	-75.31	0.278	0.33	1.044	-15.87	-75.83	0.274		NO COMPUTATION				
13 10	-14.48	-72.64	0.271	-2.47	1.050	-16.59	-73.00	0.269		NO COMPUTATION				
13 15	-16.29	-70.63	0.265	-5.24	1.056	-17.15	-70.67	0.265		NO COMPUTATION				
13 20	-18.01	-68.61	0.260	-7.95	1.063	-17.53	-68.59	0.260		NO COMPUTATION				
13 25	-19.66	-66.73	0.255	-10.62	1.070	-17.77	-66.72	0.254		NO COMPUTATION				
13 30	-21.24	-64.96	0.252	-13.22	1.079	-17.86	-65.00	0.248	68.3	0.17E 04	-6.50	-65.46	0.289	13.45
13 35	-22.76	-63.27	0.249	-15.75	1.088	-17.78	-63.44	0.242	114.2	0.20E 04	-4.94	-64.24	0.295	16.20
13 40	-24.24	-61.63	0.246	-18.21	1.099	-17.73	-61.98	0.235	168.1	0.24E 04	-3.34	-63.17	0.302	18.90
13 45	-25.67	-60.04	0.243	-20.60	1.110	-17.55	-60.63	0.228	232.8	0.28E 04	-1.71	-62.23	0.309	21.46
13 50	-27.06	-58.47	0.244	-22.91	1.123	-17.27	-59.37	0.221	308.1	0.32E 04	0.06	-61.39	0.316	24.16
13 55	-28.42	-56.90	0.243	-25.14	1.138	-17.17	-58.14	0.213	390.5	0.36E 04	1.80	-60.63	0.325	26.69
14 00	-29.73	-55.34	0.243	-27.29	1.154	-16.59	-57.02	0.205	490.1	0.41E 04	3.27	-59.93	0.333	29.16
14 05	-31.02	-53.76	0.243	-29.38	1.171	-16.25	-55.90	0.196	596.8	0.45E 04	4.95	-59.28	0.342	31.54
14 10	-32.27	-52.16	0.244	-31.39	1.191	-15.86	-54.80	0.187	715.8	0.50E 04	6.64	-58.65	0.351	33.85
14 15	-33.48	-50.52	0.245	-33.34	1.212	-15.45	-53.71	0.177	846.9	0.55E 04	8.34	-58.04	0.360	36.08
14 20	-34.67	-48.84	0.246	-35.23	1.235	-15.01	-52.61	0.168	991.1	0.61E 04	10.05	-57.42	0.369	38.23
14 25	-35.81	-47.10	0.248	-37.06	1.260	-14.54	-51.49	0.158	1149.3	0.66E 04	11.77	-56.80	0.379	40.29
14 30	-36.93	-45.29	0.250	-38.85	1.288	-14.19	-50.32	0.148	1320.9	0.72E 04	13.51	-56.14	0.388	42.28
14 35	-38.01	-43.41	0.252	-40.59	1.318	-13.71	-49.11	0.138	1509.9	0.78E 04	15.26	-55.47	0.397	44.18
14 40	-39.05	-41.44	0.255	-42.29	1.351	-13.13	-47.87	0.129	1717.5	0.83E 04	17.04	-54.74	0.406	46.00
14 45	-40.05	-39.37	0.257	-43.97	1.386	-12.57	-46.54	0.119	1943.1	0.92E 04	18.84	-53.95	0.415	47.74
14 50	-41.01	-37.18	0.260	-45.61	1.425	-12.05	-45.11	0.110	2188.6	1.00E 04	20.67	-53.08	0.423	49.40
14 55	-41.92	-34.87	0.263	-47.22	1.468	-11.48	-43.58	0.100	2456.4	0.11E 05	22.53	-52.11	0.431	50.98
15 00	-42.78	-32.41	0.267	-48.82	1.514	-10.99	-41.89	0.091	2747.4	0.12E 05	24.42	-51.02	0.438	52.49
15 05	-43.58	-29.78	0.270	-50.39	1.565	-10.22	-40.11	0.083	3067.2	0.13E 05	26.36	-49.78	0.445	53.91
15 10	-44.32	-26.98	0.273	-51.95	1.620	-9.58	-38.10	0.075	3413.0	0.14E 05	28.35	-48.36	0.451	55.26
15 15	-44.98	-23.96	0.276	-53.49	1.679	-9.00	-35.86	0.067	3788.2	0.15E 05	30.39	-46.73	0.457	56.56
15 20	-45.56	-20.71	0.280	-55.01	1.744	-8.20	-33.42	0.060	4196.3	0.16E 05	32.48	-44.82	0.461	57.75
15 25	-46.03	-17.20	0.283	-56.50	1.814	-7.48	-30.83	0.053	4655.8	0.17E 05	34.64	-42.57	0.465	58.90
15 30	-46.39	-13.57	0.286	-57.97	1.889	-6.88	-27.49	0.047	5107.4	0.19E 05	36.86	-39.89	0.468	60.00
15 35	-46.60	-9.17	0.288	-59.40	1.968	-6.37	-23.90	0.042	5608.6	0.20E 05	39.15	-36.66	0.470	61.08
15 40	-46.84	-4.52	0.291	-60.77	2.050	-5.77	-19.75	0.037	6132.0	0.22E 05	41.49	-32.68	0.471	62.15
15 45	-46.44	0.71	0.293	-62.07	2.133	-5.37	-14.85	0.033	6663.8	0.23E 05	43.87	-27.70	0.471	63.26
15 50	-45.93	6.75	0.295	-63.25	2.210	-5.26	-8.88	0.029	7173.0	0.24E 05	46.26	-21.25	0.471	64.42
15 52	-45.60	9.49	0.295	-63.68	2.238	-5.62	-6.09	0.028	7358.9	0.25E 05	47.30	-18.09	0.471	64.91
15 54	-45.17	12.48	0.296	-64.08	2.262	-6.04	-2.94	0.028	7523.7	0.25E 05	48.13	-14.47	0.471	65.42
15 56	-44.61	15.82	0.298	-64.42	2.280	0.01	0.57	0.027	7680.9	0.26E 05	49.01	-10.24	0.471	65.93
15 58	-43.87	19.47	0.299	-64.71	2.289	0.44	4.86	0.027	7743.2	0.26E 05	49.85	-5.14	0.472	66.45
16 00	-42.82	24.39	0.302	-64.89	2.285	1.42	10.15	0.027	7742.2	0.26E 05	50.57	1.37	0.474	66.95
16 01	-42.08	27.37	0.305	-64.91	2.269	2.19	13.52	0.027	7681.6	0.26E 05	50.86	5.60	0.475	67.18
16 02	-41.02	31.30	0.310	-64.85	2.238	2.76	18.07	0.028	7530.8	0.25E 05	51.04	11.25	0.478	67.38
16 03	-38.38	39.95	0.325	-64.36	2.130	4.09	28.18	0.033	6956.2	0.23E 05	50.62	23.73	0.486	67.34

Table IV

Data on field lines passing through points of the southern limit of the total phase at sea level.

TO7AL SOLAR ECLIPSE OF 12 NOVEMBER 1966

SOUTHERN LIMIT OF TOTAL PHASE

U.I.	ORIGIN				EQUATOR				CONJUGATE			
	LAT	LONG	B	DIP	L	LAT	LONG	B	ALT	ARC	LAT	LONG
LIMIT	1.87	-104.07	0.332	15.65	1.021	-7.46	-105.59	0.292	123.4	0.18E 04	-13.94	-106.80
12 43	0.87	-101.16	0.329	14.70	1.020	-8.10	-102.65	0.292	106.6	0.17E 04	-13.94	-103.76
12 44	-0.87	-96.67	0.324	13.08	1.021	-9.20	-98.07	0.292	80.8	0.15E 04	-13.97	-98.98
12 45	-1.97	-94.13	0.320	12.04	1.021	-9.78	-95.44	0.292	67.1	0.14E 04	-14.01	-96.25
12 46	-2.87	-92.20	0.317	11.18	1.022	-10.12	-93.46	0.291	55.4	0.13E 04	-14.04	-94.15
12 47	-3.66	-90.10	0.314	10.65	1.024	-11.14	-91.32	0.289	47.9	0.12E 04	-14.31	-91.92
12 48	-4.37	-89.20	0.311	9.68	1.024	-11.31	-90.33	0.290	38.5	0.11E 04	-14.07	-90.84
12 50	-5.66	-86.84	0.306	8.34	1.026	-12.10	-87.85	0.288				
12 52	-6.82	-84.85	0.301	7.08	1.028	-12.80	-85.75	0.286				
12 54	-7.89	-83.11	0.297	5.86	1.030	-13.39	-83.91	0.285				
12 56	-8.89	-81.56	0.293	4.66	1.032	-13.87	-82.25	0.283				
12 58	-9.84	-80.16	0.289	3.49	1.035	-14.24	-80.76	0.281				
13 00	-10.74	-78.87	0.286	2.33	1.037	-14.52	-79.37	0.280				
13 05	-12.86	-76.01	0.278	-0.51	1.043	-15.63	-76.29	0.275				
13 10	-14.82	-73.53	0.271	-3.31	1.049	-16.41	-73.66	0.270				
13 15	-16.65	-71.32	0.265	-6.06	1.056	-16.94	-71.34	0.265				
13 20	-18.40	-69.30	0.260	-8.75	1.063	-17.35	-69.26	0.260				
13 25	-20.07	-67.42	0.256	-11.39	1.071	-17.56	-67.38	0.254	44.9	0.14E 04	-7.56	-67.47
13 30	-21.67	-65.63	0.252	-13.95	1.080	-17.74	-65.66	0.248	81.7	0.18E 04	-6.09	-66.04
13 35	-23.21	-63.96	0.249	-16.45	1.089	-17.81	-64.08	0.241	128.1	0.21E 04	-4.55	-64.80
13 40	-24.71	-62.32	0.247	-18.87	1.100	-17.82	-62.62	0.234	186.7	0.25E 04	-2.98	-63.72
13 45	-26.16	-60.72	0.246	-21.21	1.113	-17.89	-61.26	0.227	233.1	0.29E 04	-1.37	-62.77
13 50	-27.57	-59.14	0.244	-23.48	1.126	-17.88	-59.97	0.219	330.1	0.33E 04	0.26	-61.91
13 55	-28.94	-57.57	0.244	-25.67	1.141	-17.00	-58.75	0.211	417.8	0.38E 04	1.91	-61.14
14 00	-30.28	-56.00	0.244	-27.78	1.157	-16.66	-57.59	0.203	516.8	0.42E 04	3.57	-60.42
14 05	-31.58	-54.41	0.244	-29.82	1.176	-16.41	-56.43	0.194	625.3	0.47E 04	5.24	-59.75
14 10	-32.85	-52.79	0.245	-31.80	1.195	-15.93	-55.33	0.184	748.7	0.52E 04	6.93	-59.10
14 15	-34.08	-51.13	0.246	-33.71	1.217	-15.55	-54.22	0.175	883.0	0.57E 04	8.62	-58.48
14 20	-35.28	-49.43	0.247	-35.57	1.241	-15.14	-53.09	0.165	1030.9	0.62E 04	10.33	-57.85
14 25	-36.44	-47.67	0.249	-37.37	1.267	-14.64	-51.96	0.156	1193.9	0.67E 04	12.05	-57.21
14 30	-37.57	-45.84	0.251	-39.13	1.295	-14.20	-50.78	0.146	1371.2	0.74E 04	13.79	-56.55
14 35	-38.67	-43.92	0.254	-40.84	1.326	-13.75	-49.55	0.136	1565.3	0.80E 04	15.55	-55.86
14 40	-39.72	-41.92	0.256	-42.52	1.360	-13.31	-48.26	0.126	1776.8	0.87E 04	17.33	-55.16
14 45	-40.73	-39.81	0.259	-44.17	1.397	-12.72	-46.91	0.116	2009.6	0.94E 04	19.13	-54.30
14 50	-41.70	-37.58	0.262	-45.79	1.437	-12.15	-45.46	0.107	2263.1	1.00E 04	20.97	-53.41
14 55	-42.62	-35.21	0.265	-47.39	1.481	-11.55	-43.90	0.098	2539.6	0.11E 05	22.84	-52.42
15 00	-43.48	-32.69	0.268	-48.97	1.529	-10.96	-42.20	0.089	2840.5	0.12E 05	24.74	-51.31
15 05	-44.29	-30.01	0.272	-50.53	1.581	-10.39	-40.33	0.080	3167.8	0.13E 05	26.69	-50.05
15 10	-45.02	-27.13	0.275	-52.07	1.638	-9.74	-38.29	0.072	3523.7	0.14E 05	28.69	-48.60
15 15	-45.67	-24.05	0.278	-53.60	1.699	-8.95	-36.05	0.065	3913.4	0.15E 05	30.74	-46.94
15 20	-46.24	-20.72	0.281	-55.10	1.766	-8.23	-33.54	0.058	4333.2	0.16E 05	32.85	-44.99
15 25	-46.70	-17.11	0.284	-56.59	1.838	-7.57	-30.68	0.051	4784.7	0.18E 05	35.02	-42.70
15 30	-47.03	-13.19	0.287	-58.04	1.915	-6.66	-27.49	0.045	5269.7	0.19E 05	37.25	-39.97
15 35	-47.21	-8.90	0.290	-59.45	1.996	-5.72	-23.84	0.040	5783.0	0.21E 05	39.54	-36.67
15 40	-47.21	-4.15	0.292	-60.80	2.079	-4.78	-19.58	0.035	6315.2	0.22E 05	41.88	-32.61
15 45	-46.96	1.18	0.294	-62.07	2.163	-3.57	-14.59	0.031	6852.3	0.23E 05	44.26	-27.52
15 50	-46.37	7.34	0.296	-63.23	2.240	-2.20	-8.51	0.028	7355.7	0.24E 05	46.64	-20.93
15 52	-46.00	10.12	0.296	-63.65	2.267	-1.70	-5.63	0.027	7593.7	0.25E 05	48.49	-13.99
15 54	-45.53	13.17	0.297	-64.03	2.290	-0.94	-2.45	0.027	7889.5	0.26E 05	50.17	-4.40
15 56	-44.92	16.57	0.299	-64.37	2.306	0.03	1.16	0.026	8233.1	0.26E 05	50.36	-9.65
15 58	-44.12	20.49	0.300	-64.64	2.312	0.66	5.52	0.026	8585.2	0.26E 05	50.85	-2.35
16 00	-42.97	25.35	0.304	-64.81	2.301	1.58	11.00	0.026	8856.2	0.26E 05	51.11	6.80
16 01	-42.16	28.45	0.307	-64.83	2.282	2.37	14.54	0.027	9172.9	0.26E 05	51.22	12.96
16 02	-40.95	32.70	0.312	-64.74	2.243	3.01	19.49	0.028	9574.8	0.25E 05	50.78	23.72
LIMIT	-38.60	40.12	0.325	-64.33	2.144	4.13	28.21	0.032	7040.2	0.24E 05	50.78	23.72

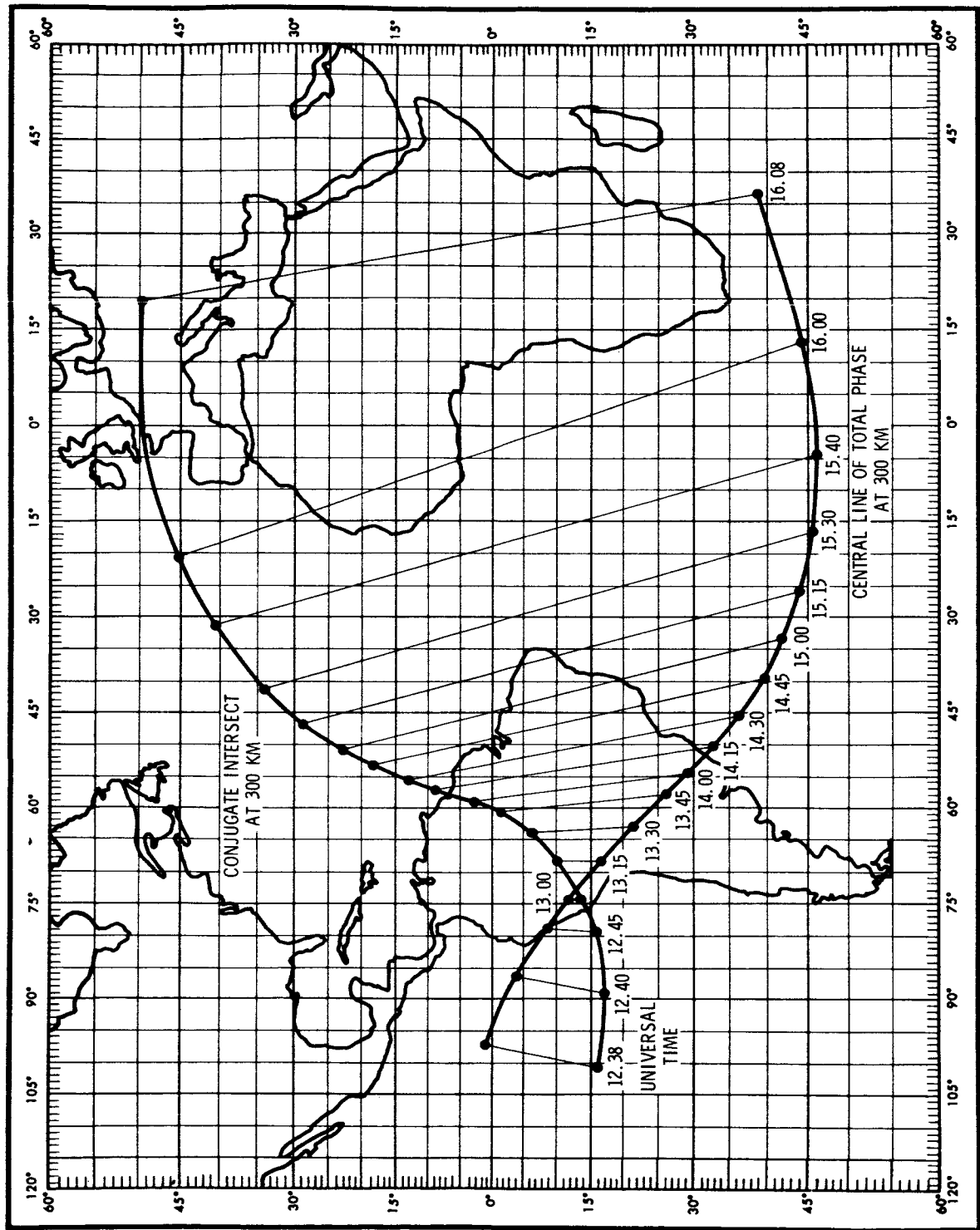


Figure 1—Central lines and conjugate intersects of the total phase at 300 Km altitude.